proximate), were in order 2 pairs (17%), 4 pairs (14%), 2½ pairs (10%), 3½ pairs (9%), 1½ pairs (6%), 1 pair (5%), 5 pairs (5%), 6 pairs (3%), 4½ pairs (3%), 5½ pairs (2%), totalling 98%. One half of a pair was represented by 1%, 7 pairs by two-thirds of one per cent, 6½ pairs, one-half of one per cent, while but one case of the 609 fronds represented 7½ pairs.

It is noted that combinations observed, but not included in the descriptive manuals were 1 pair, 6 pairs, and 7 pairs. Of perhaps greater interest is the fact that separate frequency polygons plotted from the observations made under each light condition, showed modes in the same order of predomination as that already indicated for the species as a whole.

While some of the above facts may represent the response of this fern to peculiar environmental conditions, they are perhaps suggestive to the plant systematist, ecologist and geneticist alike. Data of this kind for many species can easily be acquired on the field trips of the botanist, and may not only give us a more accurate idea of a particular species but may also lead to some fascinating problem connected with it. Finally, these observations indicate that this particular species is well adapted for an elementary class room study in variation in those regions where it is abundant.

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THE CAT TAIL, *TYPHA ANGUSTIFOLIA*, IN UTAH

J. Arthur Harris

In his comprehensive *Flora of Utah and Nevada*, Tidestrom records the occurrence of both species of *Typha*. While *T. latifolia* is well known in Utah, where it is frequently seen in the drainage waters from irrigation canals, as well as in natural habitats, the distribution of *T. angustifolia* seems to be very limited. The plant, up to the present time, has been reported from two localities only.

Typha angustifolia is familiar to students of the Eastern United States as a plant occurring frequently in brackish coastal marshes. In 1921 Wetmore* noted quite incidentally the occurrence of

*Wetmore, A. Wild ducks and duck foods of the Bear River Marshes, Utah. Bull. U. S. Dep. Agr. 936: 1–20. 1921.

both species of *Typha* in the marshes of varying salinity formed by the emptying of the relatively pure waters of Bear River into the highly concentrated waters of the Great Salt Lake. During the summer of 1923, I found *T. angustifolia* growing under conditions which make its occurrence in Utah of considerable biological interest.

The station in question represents a small area only a few square yards in extent in the marshes which are fed by the Fumerole Butte hot springs near the northern end of the Sevier desert.*

These hot springs, with a temperature of 110–178° F., are rather highly mineralized, having an osmotic concentration (determined cryoscopically) of 2.15 to 2.40 atmospheres,† and have built up considerable mounds of deposits, below which are densely vegetated sloughs. The vegetation of the low ridges between the sloughs is typical of the surrounding highly saline deserts, with the stem succulent *Allenrolfea occidentalis* (S. Wats.)Kuntze, having an osmotic concentration of its tissue fluids of forty atmospheres or more,‡ a conspicuous species.

On some very recent deposits from the springs *Sesuvium sessile* Pers., with an osmotic concentration of the tissue fluids of its succulent leaves of about twenty-five atmospheres, is the only species. A much dwarfed sunflower, presumably *Helianthus aridus* Rydb. (fourteen to eighteen atmospheres) is represented by a few individuals on the banks of the streamlets of hot water. *Glaux maritima* L. (with an osmotic concentration of twenty atmospheres) was taken near the margins of the marshes. *Crepis glauca* (Nutt.) Torr. and Gray, with succulent leaves (about eighteen atmospheres) and *Aster pauciflorus* Nutt., are also found.

*The position of this group of springs is indicated on the map of the old river bed which formed the connection between the Sevier and the Great Salt Lake Desert Sections of the main lake. See G. K. Gilbert, Lake Bonneville, *Pl. 31*, pp. 332–335. 1890.

†These are the values determined from the water emerging from the springs or from pools near the springs. After exposure to evaporation in the lower portion of the marshes the concentration of the soil solution is undoubtedly very much higher.

‡Osmotic concentrations of the leaf tissue fluids, or of the stem-tissue fluids in the case of leafless forms, has been determined by a technique developed and used for this purpose in a number of investigations published during the past several years. The results are given in round numbers of atmospheres.

In the sloughs themselves, *Scirpus olneyi* A. Gray (fourteen to eighteen atmospheres), *Juncus balticus* Willd., *Eleocharis palustris* (L.) Roem. and Schultz, and *Scirpus paludosa* A. Nels., are conspicuous. Small areas of the grass *Phragmites communis* Trin. (about eighteen atmospheres) are found near the margin of the densely vegetated areas, and extend as very dwarfed individuals into the moister saline and largely sterile surrounding areas. Where the salinity of the soil has been much increased by evaporation, the salt-grass *Distichlis spicata* (L.) Greene and some other grasses occur.

The extremely limited area occupied by *T. angustifolia* in this locality may be due to its inability to compete under the conditions of this habitat with *Scirpus*, *Juncus* and *Eleocharis* or it may indicate a recent and successful introduction in regions in which conditions are not generally suitable for its growth. *T. angustifolia* is typically a brackish water form often found in maritime marshes. It is interesting to note that the very dwarfed plants of this colony had an osmotic concentration of their tissue fluids of about fifteen atmospheres, whereas collections of *T. latifolia* taken in water of lower osmotic concentration (about 1.2 atmospheres) in high valley marshes near Moroni, Utah, had an osmotic concentration of their leaf tissue fluids of about ten atmospheres.

University of Minnesota,
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PROCEEDINGS OF THE CLUB

Meeting of October 27, 1926

The meeting was held at the Museum Building of the New York Botanical Garden. The minutes of the meeting of October 12 were read and approved. The following were elected to membership in the Club:

Mrs. Inez M. Haring, Woodland, Ulster Co., New York.

Mr. Samuel Hirschberg, 1215 42 St., Brooklyn, New York.

Mr. Edward D. Lehrer, 1519 55 St., Brooklyn, New York.

After some discussion it was unanimously voted that the last monthly meeting in November, on the Wednesday before Thanksgiving Day, be omitted, and a committee on the time and